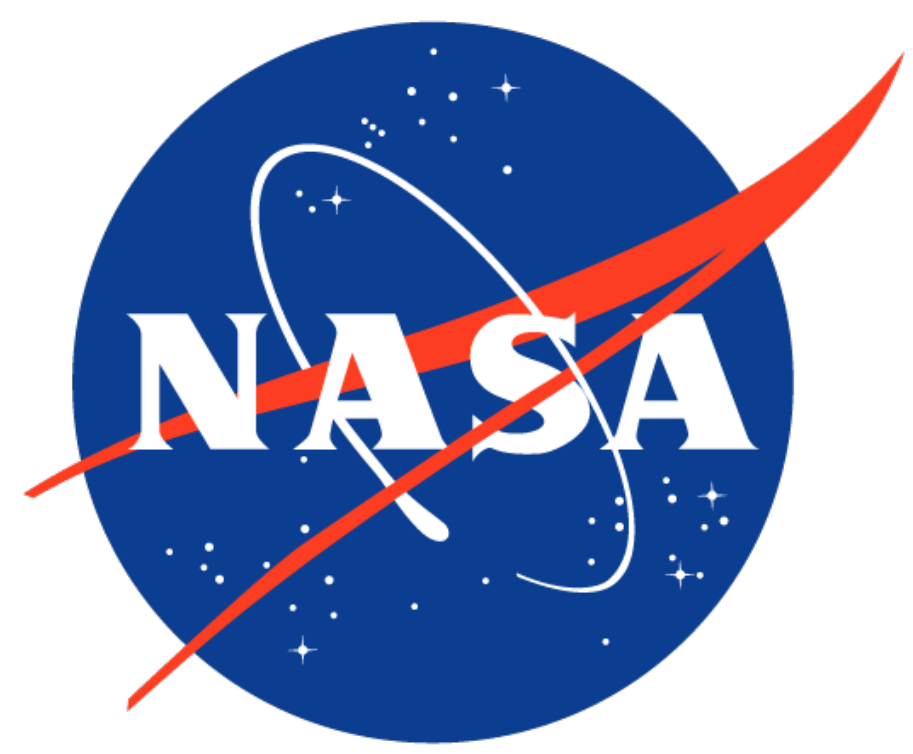# Model Investigation of Meteor Fluid Disintegration

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Investigation Aimed at Chelyabinsk meteor – Model Parameters here are only for illustration of breakdown of a fluid object
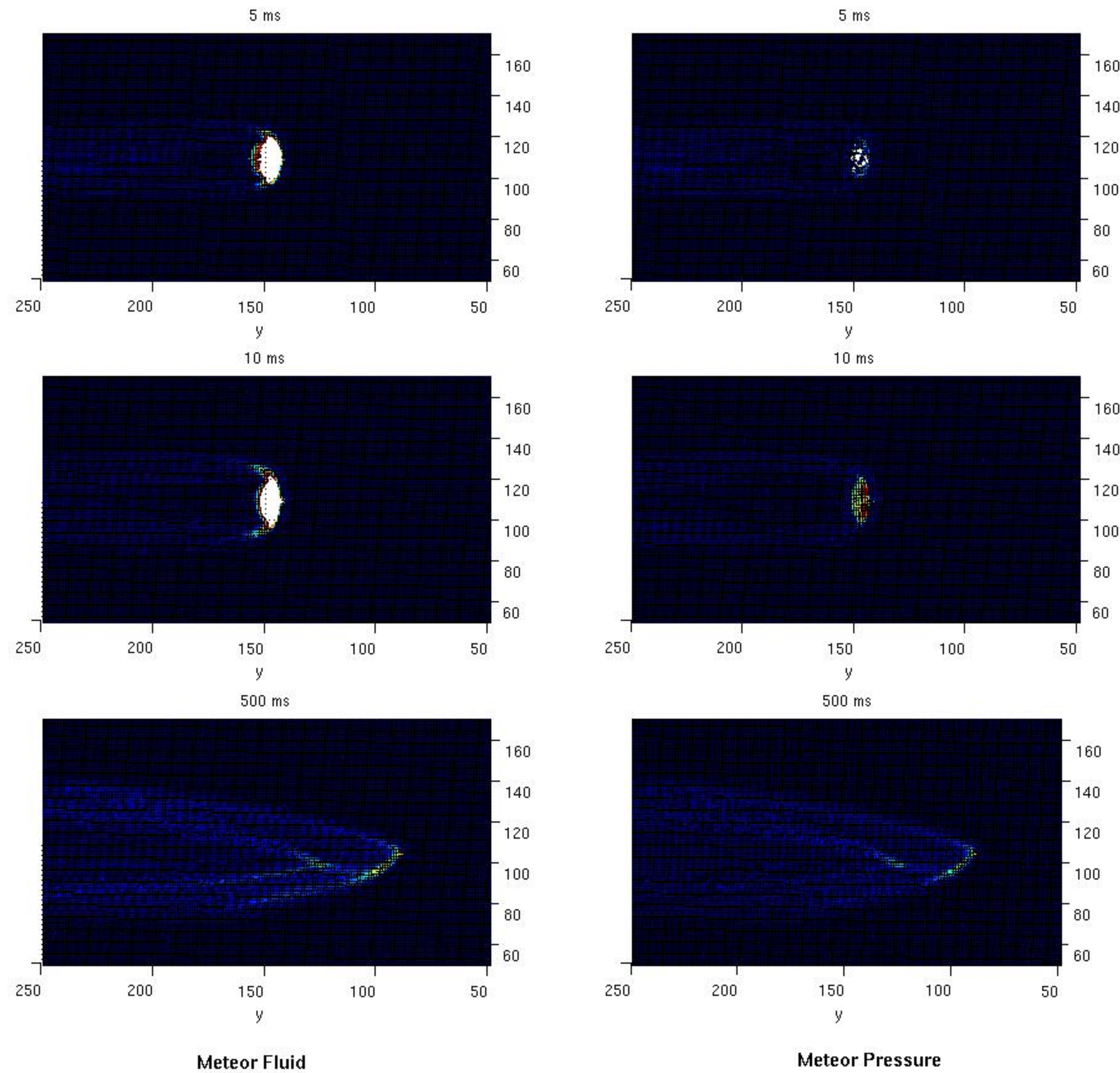
Earth Atmospheric Altitude = 20 km
Entry Speed = 3 km/s (Mach-10)

Gas-Fluid interaction model in Eulerian description
Low viscous fluid $\mu \sim 10^3$ dynes/cm²-s
➢ Strive to model higher viscosity $\mu \sim 10^8$ dynes/cm²-s

Meteor Fluid

Meteor Pressure

Pressure build-up deforms meteorite. Meteorite breaks down later.

2-D motion in moving frame

$$\bar{v}_r = \bar{v} - \bar{v}_f$$

$$\left(\frac{\partial \rho}{\partial t}\right)_r + \rho(\bar{\nabla}_r \cdot \bar{v}_r) = 0$$

$$\left(\frac{\partial \bar{v}_r}{\partial t}\right)_r + (\bar{v}_r \cdot \bar{\nabla}_r)\bar{v}_r + \frac{\bar{\nabla}_r P}{\rho} - \mu^2 \nabla_r^2 \bar{v}_r + \left(\frac{\partial \bar{v}_f}{\partial t}\right)_r = 0$$

model implementation: moving frame = centre-of-mass